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FACTORS THAT INFLUENCE EXPORT MARKETING MARGINS OF NEW ZEALAND LAMB BY GRADE: A PRELIMINARY ANALYSIS

A dissertation

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Chapter 1

INTRODUCTION:

1.1. STATEMENT OF THE PROBLEM:

Lamb producers are usually in business to try and maximise profits, and want to know what grades of lamb to produce in order to do this. They want to know what type of lamb will be in most demand in the foreseeable future, what the target market is in terms of carcase composition and weight, and which company is likely to offer the highest prices for each grade of lamb.

Producers normally have to rely on price differentials in grading schedules as a stimulant to change, but the extent to which schedule price differentials indicate differences in market demand for different lamb grades is not clear. Price differentials are often confused and weakened by many factors in the marketing chain. Consequently, they may fall short in getting a clear message about consumer requirements to the producer in order to stimulate change.

Recently there have been numerous articles printed in New Zealand farming magazines stating that farmers don't know what grade of lamb the exporter wants, including those by Shadbolt et al. (1985), Butler (1986), and Cross (1986). Lamb schedule prices may change during the season and farmers may try and keep stock on the property in order to finish them at a heavier weight or better grade, and therefore obtain a higher price, only to find that the schedule price has dropped by the time the lambs are slaughtered. Many farmers are calling for meat exporters to make their schedules available earlier in the season, however in most cases this is not occurring.

Inefficiencies in the pricing mechanism inhibit the rapid and accurate transmission of changes in supply and demand from one market level to another. The failure of exporters to set schedule prices that accurately depict the demand for lamb, leads to production decisions being made by producers that result in misallocation of resources, and a subsequent loss of economic efficiency. There have been few attempts to study the nature

of price transmissions, and no previous research has examined if the schedule price paid to farmers, are indicative of the prices received by exporters for a specified grade of lamb.

1.2 PURPOSE OF THE PAPER:

The purpose of this paper is to study the marketing margins for different export grades of lamb in order to determine if schedule prices paid to producers give an adequate representation of the export prices received by exporters. This will be achieved by reviewing the recent history of the New Zealand lamb industry and the lamb grading system in order to gain a better understanding of the current New Zealand situation. Marketing margins will then be discussed and relevant previous research examined. An attempt will be made to develop an econometric model for various lamb grade margins, in order to examine hypotheses proposed about their behaviour. Results will be reported and interpreted, and their implications discussed.

Chapter 2

MARKETING MARGINS AND LAMB GRADES;

2.1 AN OVERVIEW OF THE NEW ZEALAND LAMB INDUSTRY:

The majority of lamb produced on New Zealand farms is destined for export markets. In recent years over 90% of New Zealand lamb has been exported. To gain a better understanding of the role exporters have in determining schedule prices, recent developments in the New Zealand meat industry must be discussed.

Over the last 20 years there have been significant schedule price fluctuations which have resulted in the perceived need for price support and smoothing policies. For the period from 1954 to 1972, this was mainly through a New Zealand Meat Producer Board (N.Z.M.P.B). fund which was obtained from revenue diverted from the pre 1954 bulk purchase contract which had been running with the United Kingdom. These reserves however quickly became run down and the need for an alternative method of funding became apparent.

As a result, in 1972 the government and the N.Z.M.P.B. agreed on a new stabilization scheme, and the government subsequently introduced the Supplementary Minimum Price (S.M.P.) scheme to further smooth farm prices and farmers incomes. The government claimed that S.M.P.s meant farmers would plan and invest in production knowing in advance the minimum prices they would receive in the next few seasons, and that this knowledge would allow the agricultural sector to play its full part in generating export led growth. In later years an objective of the scheme was also to help provide the farmer with adequate income. The scheme was paid for by the taxpayer and was withdrawn in early 1984 although some payments continued until the end of the 1984-85 killing season, and to some extent it can be blamed for some of the current industry problems (Griffith and Martin 1988).

During the early 1980's there was considerable disagreement between exporting firms as to what was a realistic price level for meat. This problem can be seen as one of the major reasons as to why in 1982, the government imposed statutory control, and the New Zealand Meat Producers Board assumed complete control over the export marketing of

sheepmeat. The result was a single selling environment and many companies changed the emphasis of their operations. As further processing was not controlled by the board, companies withdrew resources from carcass marketing activities and concentrated on the processing and marketing of by products, and the development of further processed products. Generally, further processing consisted of boned or boneless consumer cuts, although some companies were involved in activities that required a higher degree of further processing, such as reformed meats and canned meats. Not all of these further processed meats proved to be successful and many companies have recently reviewed and refined their approaches to the further processing of sheepmeat products (Zwart and Martin 1988).

By 1985 it was apparent that the Meat Board control of the meat industry had created more costs than benefits. In December 1985 the Meat Board handed control of meat exporting back over to the private companies on the condition that an orderly and coordinated approach was established and adhered too. During 1985 the government also reduced, and then removed S.M.P.'s. With the removal of these support programmes, meat prices fell drastically, and this is one of the major reasons why lamb production has fallen over the last few years.

In 1985 Meat Board control of the meat export industry ended. In order to reach the condition of an orderly and disciplined approach the Meat Industry Association (M.I.A.) was formed where competing companies come together to discuss and action matters of mutual concern. All exporting companies belong to one of five groups with each group having representatives on a marketing committee of the M.I.A. A meat industry plan is developed by the M.I.A. with each company being required to provide a marketing plan indicating anticipated quantities to be marketed in individual countries. The structure is essentially a voluntary cartel which has resulted in a high level of coordination for the marketing of carcass meats. The marketing of further processed meats is not covered by these arrangements.

The M.I.A. coordinates individual marketing plans for individual markets using a complex allocative procedure to allocate meats. A simple example of this procedure is the work of the Meat Marketing Corporation (M.M.C.), which controls meat flows to some

of the single buyer and disposal markets. Individual firm contributions to these markets is decided on a pro-rata basis (the share of a particular market is dependent upon each country's proportion of the net kill). While other less formal arrangements exist in other markets, there are plans to develop a more sophisticated control mechanism for the United Kingdom market.

The processing and marketing operations for lamb in New Zealand are two separate functions, although they are totally reliant on each other. The processor does not necessarily own the meat although he may own and market other products such as skin, wool and hides.The exporter owns the meat and is responsible for exporting it. Many companies both process and export meat.

The New Zealand Meat Act (1981) is administered by the Ministry of Agriculture and Fisheries, and deals with such matters as the licensing of meat processing plants, packing houses and abattoirs, for both domestic and export processing and inspection. It embodies an "open door policy" which gives farmers statutory access to the works of their choice. To obtain a licence processing plants and packing houses must comply with hygiene requirements and local authority by laws. One of the requirements of the New Zealand Meat Act is that killing and processing charges are set regardless of market place results.

Fifty seven processing plants operate in New Zealand with licences to export owned by 27 companies, therefore the environment is very competitive. There are 66 licensed meat exporters which may also own proceessing plants, with the majority of processing and exporting being done by a few large companies (N.Z. Meat Industry Association, 1989). The exporter arranges for the processor to process, cut and pack meat according to the specifications for the customer.

With the removal of meat industry control in 1985, individual exporting companies resumed ownership of meat and started to produce their own schedules, in which they state the schedule prices paid to farmers. "The exporter sets a buying schedule according to anticipated realisations and with regard to competition" (N.Z. Meat Industry Association, 1989). When lamb grades are in high demand, companies often pay a premium. Most operators publish their buying prices in newspapers and their company news letters and recently, at least one private company has started to issue publications

containing many companies schedule prices. The New Zealand Meat Producers Board still retains the right to issue its own schedule of meat export prices when exporters offer prices it considers to be too low, as happened in the period from 1982 to 1985, however this is not currently occurring. This would involve the board not only setting schedule prices, but also arranging for the overseas marketing of various products.

Producers can sell their export meat on schedule, on a pool account system, on the hoof, or through a particular cooperative. In marketing through company pools, producers receive an advance payment of approximately 90% of the schedule price, with the possibility of receiving an end pool payment if a surplus is achieved. Currently it is not known how much meat is sold in pools, and as no data exists on pooled lamb returns, this study will only examine margins on the export meat sold by schedule.

Since September 1985, there have been no government intervention mechanisms which stabilise, support, or otherwise modify prices paid to producers, and therefore farmers incomes have not been stabilised or supported. For this reason this study is only concerned with the period since September 1985, when individual companies have been free to set schedule prices without government intervention. Although the M.I.A. coordinates the marketing plans for individual companies, companies are free to produce their own schedule prices which they do. In order to understand fully the nature of the market meat grades, their specifications must first be discussed.

2.1.2. LAMB GRADES:

In New Zealand a standard system of classifying grades of meat is used. These grades were radically changed in the 1983-84 slaughter season and smaller revisions have been made since then. Export meat is graded according to the type of animal, weight, age, and fat content, with the grades being established by the New Zealand Meat Producers Board. When individual companies desire more precise lamb specifications then the Meat Board grading schedules give, companies may set their own grades, such as Waitaki has done with its lean, heavy weight WX grade.

For grading purposes a lamb is defined as a sheep of less than twelve months of age, with sheep born in spring being termed lambs until the 30th September the following year. A summary of some of the lamb grades is given in table 1.

Table 1 **Export Carcase Grades:**

	A	Y	P	T	F
Fat content	Almost devoid	Light	Medium	Heavy	Excessive
GR measurement	None	YL-up to and incl. 6mm	PL-over 6mm up to and incl. 12mm	Over 12mm and up to and incl. 15mm	Over 15mm
		YM-up to and incl. 7mm	PM-over 7mm up to and incl. 12mm		
WEIGHT:		YX up to and incl. 9mm	PX/PH over 9mm up to and incl.12mm		
Less than 9.0 kg	A				
9.0kg and over-Up to and incl. 12.5 k.g		YL	PL	TL	FL
13.0kg and over-Up to and incl. 16.0kg		YM	PM	TM	FM
16.5kg and over-Up to and incl. 20.0kg		YX	PX	TH	FH
20.5 kg and over			PH		

Source (N.Z. Meat Producer, 1985)

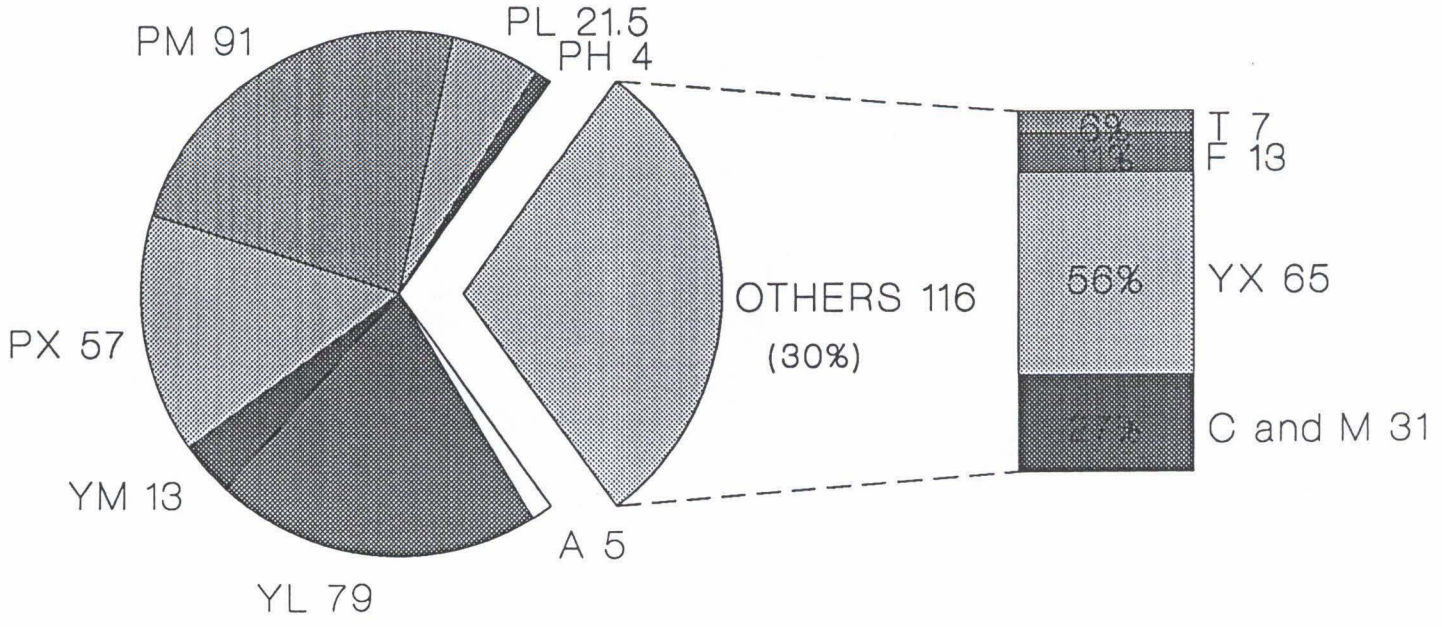
Note: C and M grades are not shown on the above table.The very light grades (Alpha and Beta) have also been excluded and cannot be included in this study as there is no data available on their export.

Grade A, Y, and P carcasses can be exported with no trimming of excess fat while grade T and F carcasses are trimmed of excessive fat prior to export. A loss of yield from the removal of excess fat and the increased labour costs involved in cutting and trimming carcasses, results in lower returns for grade T and F carcasses, with the most serious penalty occurring for carcasses graded F.

Cutter carcasses (grade C) contain damaged or mutilated carcasses from any of the five fatness grades and are not eligible for export in carcase form, due to either trimming or mutilation, although intact cuts from these carcasses may be exported. Grade M, the manufacturing grade, includes carcasses that are too thin for export, are damaged, or weigh less than 9 k.g. but have a higher fat content then is allowable for the A grade. Cuts or carcases from grade M lambs may not be exported. As farmers have very little control over whether their stock will become C or M grade carcasses, and there is no data available on the export of C grade cuts these two grades have been excluded from this study. No data exists on the export of T and F grades so these have also been excluded. The grades in which margins will be analysed are grade A, PL, PX, PH, PM, YL and YM.

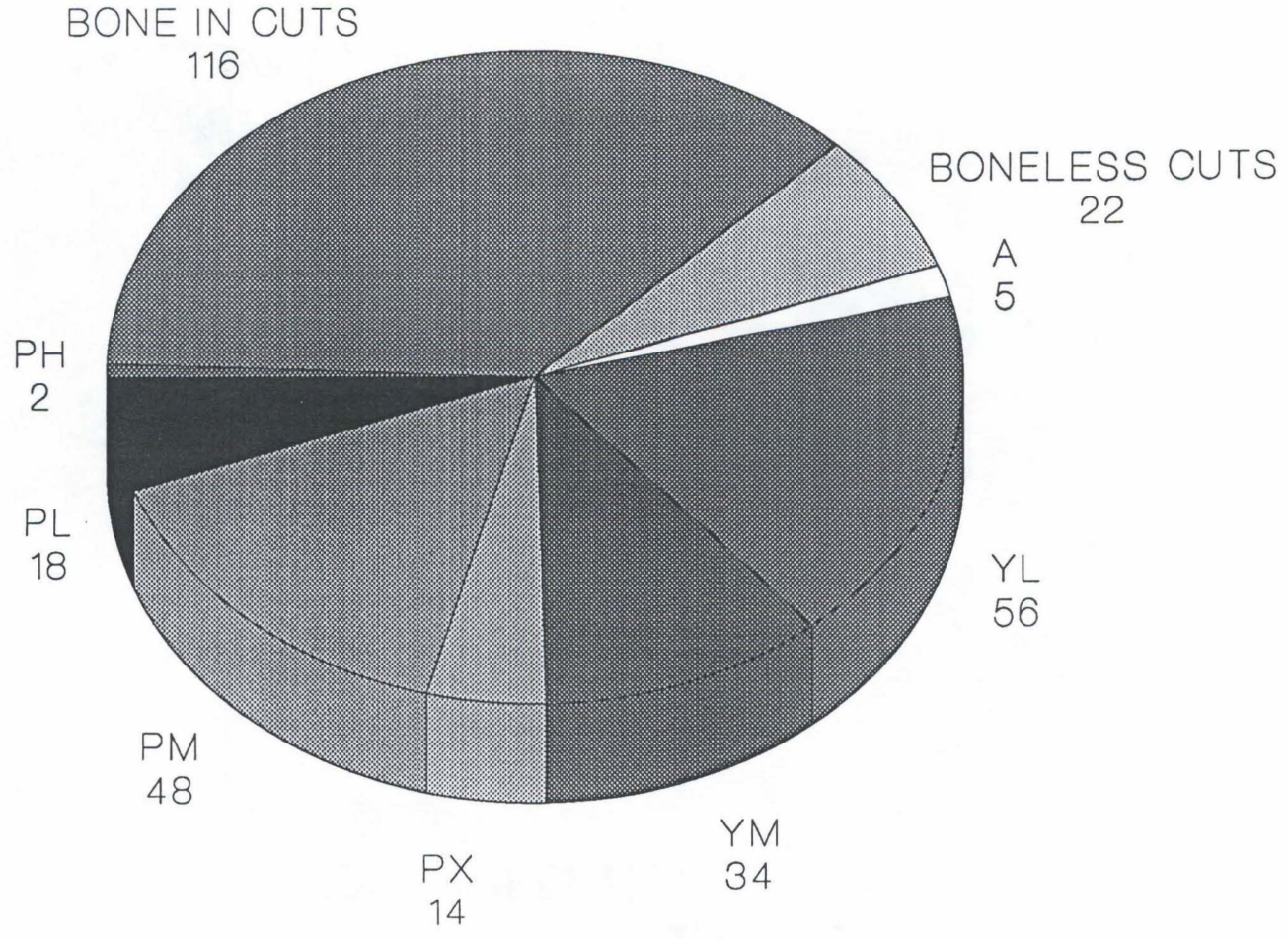
The relative importance of the lamb grades being studied is shown in graphs one, two, and three. Graph one presents information on all of the grades slaughtered for export, while graph two and three only present information on the lamb grades being studied. Grade YX lambs make up a large proportion of the lambs not included in this study (others) for the 1987 to 1988 season. YX lambs cannot be considered for this study as as there is insufficient export data available on YX lambs during the early period of the study. Of particular significance to this study is the large volume and value of cuts, especially bone in cuts being exported as is shown in graphs two and three. From the export data it is impossible to tell from which grades cuts originate.

LAMBS SLAUGHTERED BY GRADE (000 tonnes)
1987-1988 KILLING SEASON
Graph 1



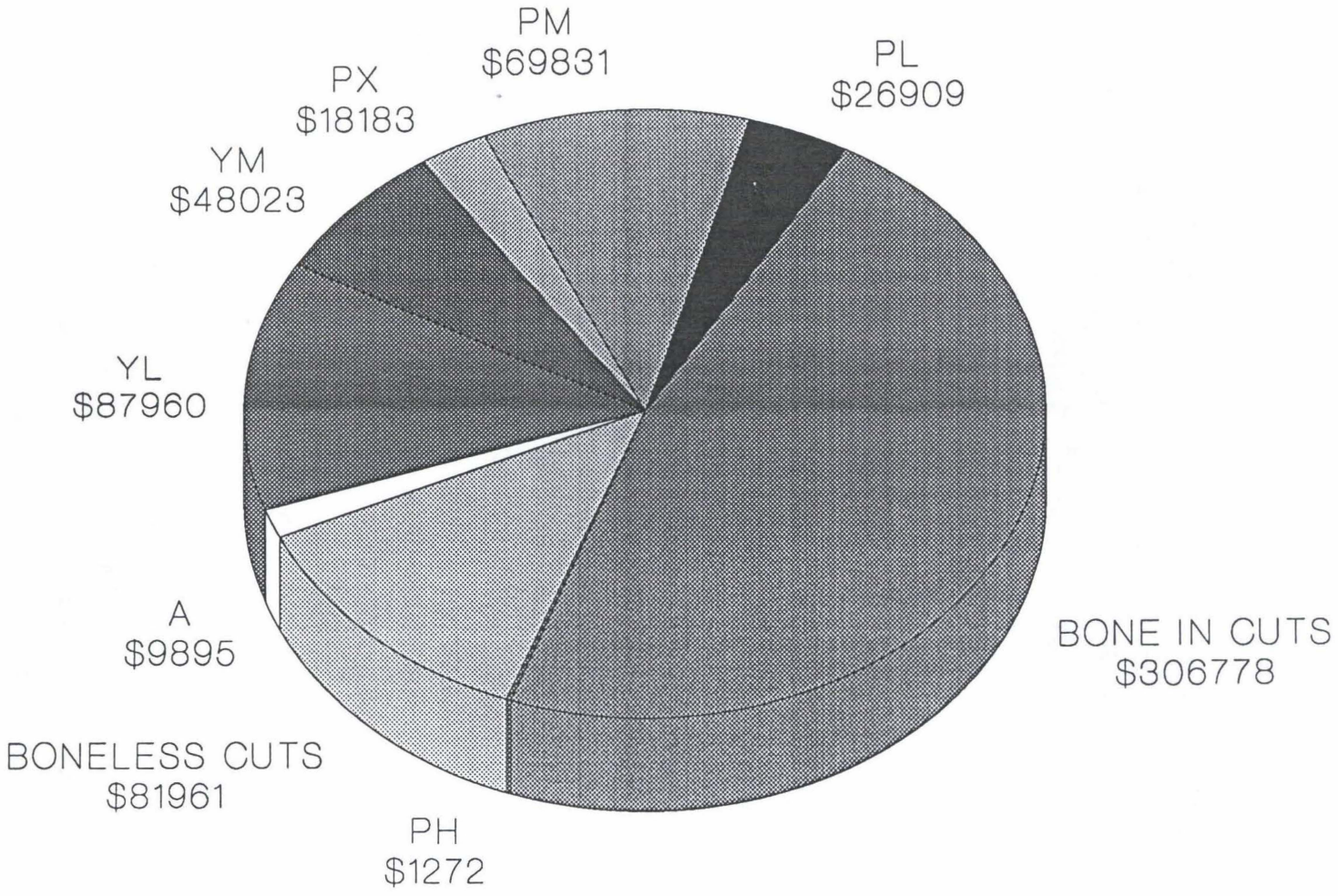
Graph 2

F.O.B. EXPORTS (000) TONNES
1987-1988 KILLING SEASON



Graph 3

F.O.B. EXPORTS $(000)
1987-1988 KILLING SEASON



2.2.1. MARKETING MARGINS:

In this study the marketing margin of meat refers to the margin between the price farmers receive for lamb (schedule price) and the equivalent price of lamb, F.O.B. export. As it is the price for meat that is being examined, payments for pelts, wool, and by-products are excluded from this study.

Tomek and Robinson (1981) point out that elementary texts on price theory say little about marketing margins both at farmgate and wholesale level. This is especially important in agricultural economics in terms of wholesale and farm prices. Farmers are often concerned about the cost of marketing services, especially in terms of the amount of the final consumer dollar which is involved in marketing, processing and wholesaling. However Campbell and Fisher (1982) explain that farmers often tend to overlook many services which are required to satisfactorily market agricultural products including insurance, risk bearing, interest on capital, and depreciation on assets required to market goods.

Although the relationship between lamb prices at the farmgate and wholesale/retail level may be affected by changes in marketing arrangements and marketing costs, movements in prices at both ends of the marketing chain are primarily determined by:

1. The level of demand including the level of export demand, and domestic demand factors such as prices of substitute meats, movement in incomes, population, and changes in tastes. The demand for lamb in the major importing countries relative to local supply has a significant impact on the level of prices on the New Zealand market as New Zealand exports approximately 90% of the lamb it produces.
2. The level of supplies. Changes in the level of domestic supplies of meat are influenced by a wide range of factors including the price for meat itself, seasonal conditions, and relative returns to producers from alternative production, such as beef or wool (Blyth 1983).

It has however been clearly established, that marketing costs are a major component of the wholesale price of meat (Houston 1962, Griffith 1974, Fisher 1981, Tomek and Robinson 1984). This suggests that changes in marketing costs exert an important influence over movements in marketing margins. The size and shape of the margins depends on the elasticity of the supply of marketing services. For example, if the supply of these services is perfectly elastic, there will be a constant margin as the demand for marketing services increases.

Over the long term, developments in meat marketing will strongly influence the level of meat prices, the quality of meat, and the conditions under which it is exported. A

number of factors influence long run increases in marketing costs, including changes in cost levels and increased provision of marketing services, for example, more precise specifications of meats and increasingly rigid hygiene requirements. Further processed meats, cuts, and fresh meat exports would be likely to have higher marketing margins due to the increased costs involved. Although these developments are likely to have an increasingly upward influence on marketing costs continued research and extension, aimed at assisting in the development and adoption of new technology and methods of market operation can minimise their effect on prices.

2.2.1. Price Levelling and Averaging:

Levelling and averaging are two effects which are often blamed for causing distortions in the pricing mechanism which determines schedule prices. In this study levelling refers to the practice of exporters holding their schedule prices relatively stable in times of fluctuating export returns. Averaging involves setting a lower margin on one lamb grade, while recovering losses by setting a higher margin on another grade. It is essentially a cross subsidisation between lamb grades.

Parish (1967) provided a detailed discussion on price levelling and averaging, where he reviewed some of the previous research conducted, and then discussed price levelling and averaging from a theoretical viewpoint. He stated that levelling is practiced by the meat trade in many countries, and asked the question "are levelling and averaging a distinct phenomena or are they both a consequence of some general feature of retailers behaviour"? Griffith (1974) used an econometric model to examine if it is levelling, averaging, or a combination of both levelling and averaging that is preventing the the adjustment of current prices to changing market conditions. Stickiness of schedule prices, or the lag in adjustment of schedule prices to changes in export prices may lead to levelling.

In Stigler's (1971) article on oligopolistic competition, he stated that short run price levelling often benefits the retailer. Stigler discussed three explanations of price levelling which results in the stability of retail prices. These same factors may also be used to explain the stability of lamb schedule prices in New Zealand, and the benefits exporters get from price levelling.

Stigler's three explanations of price levelling are:

1. Long run considerations.

Price changes may be the result of only temporary changes in supply and demand. If because of levelling, the market system fails to respond to such price changes, little harm will be done in the short term. Averaging of prices between lamb grades means

companies can maintain a competitive schedule price for a grade of lamb that is receiving low export returns in the short run, and therefore producers loyalty will not be lost to competitors. To maintain competitive schedule prices, grades receiving low export returns may be subsidised by grades receiving high export prices.

2. The cost of price changes.

Administrative advantages of levelling and averaging include the fact that exporters may be reluctant to change schedule prices because there are costs associated with these price changes. The cost of changing schedule prices involves more than the mental effort needed to derive a new price schedule as the effect of changed prices on supply needs to be predicted, and reactions from competitors considered.

3. Administrative weaknesses in collusion.

An individual meat company would no doubt be prepared to vary his schedule prices below or above the average of his competitors if he felt that this would increase his profits. Houston (1962) concluded that one of the major causes for the general acceptance of price levelling in the retailer butcher scene in Britain over the season, is that traders fear price wars. If New Zealand meat companies are competitive, they may keep their schedule prices relatively close together, and not fluctuate them greatly, even in time of fluctuating export returns.This would lead to price levelling, and maybe averaging.

Not only exporters benefit from stable schedule prices, many farmers may also prefer the stable prices that result from price averaging and levelling to unstable prices. If there was long term price levelling resulting in more stable schedule prices, farmers would be able to plan production in advance. If schedule prices were guaranteed for later in the season (which would be likely to require price levelling and maybe averaging) producers could determine if it would be more profitable to sell lambs now, or to hold stock on the property in order to obtain heavier grades and more profitable weights. Another benefit of more stable prices is that infrequent price changes may carry more weight with producers than frequent price changes (Houston, 1962), as farmers may take more notice of schedule price changes when they are infrequent. A disadvantage of fluctuating prices is they may "engender production cycles which in turn means that excess resources may be devoted to certain commodities during some periods, while remaining under utilised during others" (Tomek and Robinson 1982). However with sufficient market information and no levelling or averaging, if prices are in error, the speculative behaviour of producers and buyers should move them back to equilibrium levels.

There are however criticisms of price levelling and averaging because they lead to price distortions and therefore inefficiency. While levelling and averaging have important

administrative advantages, they distort the accurate transmission of prices from export to schedule levels. "Failure of the marketing system to reflect in consumer prices persistent seasonal differences in production costs can only be described as pricing distortion" (Parish 1968). While Parish is talking about the interaction of consumer prices which are led by farmgate prices in Britain, we can say the same distortion would occur if schedule prices did not follow movements in export prices.

Levelling and averaging distort price relationships, and hinder or prevent the proper mutual adjustment of supply and demand, which leads to misallocation of resources with a subsequent loss of economic efficiency. A pricing system that does not accurately communicate the quality preferences of the buyer by rewarding or penalising the producer for different lamb grades produced, impedes quality improvement and industry effectiveness.

2.2.2.Pricing efficiency and the importance of market information:

Williams et al. studied pricing efficiency in South East Queensland cattle auctions and stated that pricing efficiency refers to the accuracy with which markets reflect the true supply and demand conditions in a market. An efficient pricing system accurately reflects perceived quality differences over time and space. A pricing system that fails to do this is inefficient in that producers will not be paid the true value of their product, and consequently the market system will be unable to carry out its role of efficient resource allocation. Efficient prices should provide signals about resource scarcity and reflect consumer preferences. Levelling and averaging lead to pricing inefficiency as they distort market signals.

Information is central to an efficient operation of livestock markets. An efficient pricing system contains all necessary information about preferences of buyers and the availability of the product to enable market participants to make optimal buying and selling decisions at both a point and time in the future, given the market situation. While this study does not attempt to analyse the impact market information has on production decisions, the importance of the fact that participants should have easy access to information must be stressed.

In Phillips (1968) review of marketing he considered information to be an important if not fundamental part of the marketing process. Adomowicz et al. (1984) studied pricing efficiency in Canadian hog markets and indicated the essential role of information, stating that "one of the main functions of an efficient marketing system is to facilitate the flow of information. The prices resulting from the flow should accurately reflect the supply and demand situation". Both buyers and producers can benefit from market information.

Producers should be able to use schedule prices to obtain a clearer picture of the strengths and weaknesses of various sectors in the market. It is here that buyers preferences should be reflected in differing prices for different grades of lambs in different parts of the country. Producers can use this information to decide whether it is more likely to be profitable to sell animals at their current weight and grade, or to condition them to obtain a better grade, and/or a more heavy weight. One thing that of course market news cannot do is insure that market will be used with equal intelligence by farmers who receive it.

To summarise while levelling and averaging distort the transmission of prices between wholesale and farmgate levels, the damage they cause is balanced by many short term benefits. Even if schedule prices indicate market demand (as they should in the absence of price levelling and averaging), the efficient operation of New Zealand lamb markets requires producers to have easy access to information on the schedule prices paid by exporters. Research is being continually conducted to examine the nature of price transmissions, and marketing margins for meat.

2.3. PREVIOUS RESEARCH CONDUCTED:

In recent years there has been considerable research in which margin models have been used to describe and predict changes in marketing margins, however there has been no research on price differentials for margins between different livestock grades.

Gardiner (1974) used mathematical models and derived theoretical equations to find simultaneous equilibrium in the retail food, farm output, and marketing services models. Gardiner stated that no simple pricing role (i.e. a fixed margin, a percentage margin or a combination of the two) accurately depicts the difference between farm price and retail price. This is because these prices move together in different ways depending on whether price movements originate from the retail demand or farm supply, side, or a shift in the supply of marketing inputs.

Other studies like Fisher (1980) have looked at how farm prices change as a result of changing marketing margins. Fisher was however only concerned with cases where the change in marketing margins is the result of an exogenous shift in supply of marketing services. A theoretical approach was used to show that for most agricultural products, the major adjustment to changes in marketing margins will be made to farm prices. Farmers therefore have a strong economic interest in promoting efficiency in the service sector.

MacArthur's (et al. 1985) study of price transmission in Canada examined the links both vertically (between levels in marketing channels), and horizontally (between market

areas), for beef and pork. One of the major relationships of interest to the producer, is the time lag that exists between a price change at one level and subsequent price changes at other levels. The length of time for prices to be transmitted along the marketing channel has implications for pricing efficiency within the channel, and a lag in adjustment to price changes may cause levelling. Information about the lag-lead relationship between price changes at different levels of the marketing channel gives more knowledge of the pricing efficiency associated with these products, and provides some information as to whether or not the marketing mechanism is working adequately, at least in respect to time. MacArthur (et al.) found that farmgate prices lead retail prices, as the farmgate demand curve is shifted by wholesaler anticipation of retail price changes. The result does not agree with theory which states if farmgate demand is a derived demand, retail prices should lead, followed by wholesale prices, with the demand at the farmgate shifting later (Tomek and Robinson, 1982). In this study I am assuming that meat exporting companies as a whole control their margin and that farmgate demand is a derived demand.

Very little research has been conducted that examines the nature of price transmissions between different meat types, or meat grades. Woodward (1968) tested data for price levelling and averaging by simple regression, and for price levelling by stimulation and spectral techniques. He however ignored relationships between different meat types and the independent nature of market participants behaviour, as well as lags in the system and the effects of marketing costs. Marceau (1967) developed a quarterly regression model that tested for price levelling and wage turnover effects for meat in New South Wales. Single equation methods were used to estimate the required parameters. As Marceau's (1967) regression equations only took into account the actual meat being examined in each equation, price averaging could not be tested for.

In his study of Sydney meat marketing margins, Griffith (1974) developed a model containing aspects of Marceau's work, but also including components of margin models developed by Yandle (1968), Barr and Gale (1973) and Fuller and Ladd (1961). Models were developed for both wholesale and retail margins for pork, beef mutton and lamb.

Griffiths regression equation for lamb was of the form:

MWL = f(PAL, CWS, LPAL, MWB, MWM, MWP, TL)

where MWL = Wholesale margin Lamb
PAL = Auction Price Lamb
CWS = Wholesale Cost Sheep
LAPL = Lagged Auction Price Lamb
MWL = Wholesale Margin Beef
MWM = Wholesale Margin Mutton
MWP = Wholesale Margin Pork
and TL = Turnover Lamb

Similar models were developed for other meats.

His results showed that wholesale margins were negatively related to current auction prices and positively related to lagged auction prices. This result suggested short run price levelling with longer term adjustment of wholesale margins to trends in auction prices, and basically agreed with comparable results from Woodward (1968). Price averaging also occurred at the wholesale level.

Criticisms of Griffith's (1974) study include those made by Naughtin and Quigley (1979) who stated that a major deficiency in the studies of Griffith (1974) and Marceau (1967) was the lack of an explicit link between the formation of a marketing margin and the profit maximising of butchers. Dusenberry (1968) discussed the problems associated with using aggregate economic variables to test micro level behaviour. He stated that derived aggregate relationships do not hold for ordinary firms and there are two principles to be observed when testing hypothesis about aggregate behaviour. These are:

1. Every hypothesis ought to be stated in terms of behaviour of the individual firm
2. Hypotheses ought to be tested against data which indicates the behaviour of individual firms.

Due to the problems of obtaining data from individual firms and the desire to study the aggregate behaviour of meat marketing margins these factors cannot be considered for this study.

Naughtin and Quigley (1979) attempted to model the pricing behaviour of retail butchers on a micro level basis using theory developed by Holton (1957) and Holdren (1960) in the supermarket context. Naughtin and Quigley assumed kinked demand curves, so when prices are high, demand will be more elastic. Conversely, demand will be less elastic when prices fall.They concluded that averaging and levelling may not just occur in the short run but also in periods of more than one quarter. Again, this approach cannot be considered here due to the difficulties of obtaining data and the desire to study the aggregate behaviour of marketing margins.

In order to analyse monthly marketing margins for pork on the Sydney market Griffith and Duff (1989) modified Griffith's (1974) model to include a lagged dependent variable and risk variable. A risk factor may influence the marketing margins for New Zealand lambs by grade, and therefore should be discussed. Sandmo(1971) and McCall (1967) examined price uncertainty and risk, and found that a competitive firm under price output uncertainty, will produce less then the same firm without risk providing it is risk averse. Other papers have also examined the output price risk of marketing margins including Brorsen et al.(1985) who determined the effect of changes on output price risk on marketing margins in the U.S. wheat market. Brorsen et al. (1985) used theoretical models to show that if marketing firms are competitive and decreasingly absolute risk averse, then an increase in price risk results in higher than expected marketing margins. They used empirical evidence to support their claims. In Griffith and Duff's (1989) model price levelling occurred while price averaging did not. The risk variable did not prove significant, and for this reason has not been considered for this study.

No previous research appears to have been published which examines the margins for different grades of meat. Marketing margin models like those developed by Griffith (1974) and Griffith and Duff (1989) may however be modified in an attempt to do this.

Chapter 3

MODEL SPECIFICATION:

3.1.SPECIFICATIONS OF THE MODEL USED:

The model incorporates aspects of Griffith's (1974) meat marketing margin model. As this model analyses different meat grades, meat grade margins have been substituted into the model in place of meat type. A lagged dependent variable has also been included. Grades of meat to be analysed are A, PL, PX, PH, PM, YM, and YL, with the model being repeated for each of the 7 grades of meat being analysed.

Model specifications are:

$$M_i = f(P_i, P_{it-1}, M_{it-1}, M_j, MC, S_i, VC)\ _{j \neq i}\ _{j=1..i..7}$$

where: the subscript $_i$ represents the grade of meat being analysed

and M_i = Monthly Wholesale margin for each lamb grade, or the difference between the F.O.B. export price of lamb and the schedule price paid to farmers in cents/kilogram.

P_i = Monthly F.O.B. export prices of lamb grade$_i$ in c/kg

P_{it-1} = Monthly lagged F.O.B. export price for lamb grade i in c/kg.

M_{it-1} = Lagged Monthly margins on the grade of lamb being analysed in c/kg.

M_j = Monthly margins for all other grades of lambs being studied except grade M_i in c/kg.

MC = Monthly marketing cost. As no information is available for wholesale costs for grade a quarterly proxy is used.This is the Producer Price Index

for wages in the private sector for food, beverages and tobacco. The index used had a base value of 1000 in the quarter ended Dec 1985.

S_i = Monthly slaughterings for lamb grade$_i$ in 1000 kg.

VC = Total monthly F.O.B. export value of lamb cuts in $(000). This includes both fresh and frozen, and boneless and bone in lamb cuts which may have originated from any lamb grade.

The sources of data are presented in appendix 1.

Current export prices (P_i) are present to test the hypothesis that schedule price levelling for each grade of lamb does not occur on a monthly basis. Without levelling marketing margins remain relatively constant, and do not fluctuate in response to movements in export prices. With levelling, at times of high export prices a high margin (M_i) is expected while during times of low export prices a low margin is likely. Levelling implies margins rise as export prices rise, therefore a positive coefficient is expected for P_i. As margins are not likely to change the full extent that export prices do, the coefficient is likely to be less then one.

A negative coefficient on the lagged export price suggests the longer term coincidental adjustment of wholesale margins to trends in export prices. Previous studies, such as those undertaken by Marceau (1967), Griffith (1974), and Griffith and Duff (1989) used auction prices rather than export prices as the variable to test for price levelling, because auction prices were the price from which wholesalers based their margins. This gave rise to a negative coefficient on auction price rather than the positive coefficient we would expect for P_i, if price levelling is occurring in this model. The lagged auction price for previous studies is also assumed to have the opposite sign from which we would expect for lagged export prices. In this example New Zealand exporters receive a price for their exports and then develop their margins from this, therefore an elastic export demand is assumed.

As the model is a complex dynamic structure with lags, multipliers and not coefficients should be used to interpret the effect of export price changes and the long run effects of

changes in any variable. Short and long run multipliers have been derived to examine the way that schedule prices change in response to changes in export prices. A long run multiplier for the changes in margins with respect to price has also been determined.

The multipliers were derived as follows:

$M_i = a + bP_i + cP_{it-1} + dM_{it-1} + eM_j + fMC + gS_i + hVC$ (1)

$M_i = (P_i - F_i)$

where a is the constant, P_i is the export price, and F_i is the schedule price paid to farmers for lamb grade $_i$.

Assuming that the margins for other grades, wholesale costs, slaughterings, and the value of cuts are constant, equation (1) can be simplified to:

$P_{it}-F_{it} = a + bP_{it} + cP_{it-1} + d(P_{it-1}-F_{it-1})$ (2)

Rearranging equation (2) gives:

$-F_{it} = a + (b-1)P_{it} + cP_{it-1} + d(P_{it-1}-F_{it-1})$ (3)

Differentiating gives:

$\frac{dF_{it}}{dP_{it}} = -(b-1) = 1-b$ (the short run schedule price multiplier)

This shows the effect that changes in export prices have on schedule prices in the short run (periods of one month or less).

Long run multipliers can also be derived. In the long run assume a stable state therefore $P_{it} = P_{it-1}$ and $M_{it} = M_{it-1}$. To derive the long run schedule price multiplier rearrange equation (3) to:

$P_i-F_i = a + bP_i + cP_i + d(P_i-F_i)$ (4)

rearranging (4) gives:

$$-F_i = \frac{a + (b + c + d - 1)P_i}{(d-1)} \quad (5)$$

and then differentiating results in:

$$\frac{dF_i}{dP_i} = \frac{c+d+b-1}{(d-1)} \quad (6)$$

(the long run schedule price multiplier).

The long run multiplier for margin changes is derived as follows:

$$Mi = a + bP_i + cPi + dMi$$

$$Mi = \frac{a + (b + c)P_i}{(1-d)}$$

and by differentiation:

$$\frac{dMi}{dPi} = \frac{b + c}{(1-d)}$$

(the long run margin multiplier)

The use of coefficients is satisfactory to interpret the results for short run behaviour of the variables M_j, MC, Si and VC.

A significant long run, schedule multiplier of near zero and margin multiplier of close to one implies that long run levelling of schedule prices is occurring. With levelling, margins change, increasing when export prices rise, and decreasing when they fall, therefore a positive coefficient is likely for the long run margin multiplier. The long run schedule price and margin multipliers essentially measure the same thing, that is the way margins (and therefore schedule prices) respond to long run export price changes. Without levelling, schedule price changes will follow export price changes, and the long run schedule multiplier will be close to one. The margin will stay stable in times of fluctuating export returns and schedule prices will fluctuate with export prices.

Averaging involves setting a lower/higher margin on one meat grade while recouping losses/gains by setting higher/lower margin on another meat grade or grades. The hypothesis that there is no price averaging, is tested for by including the margins for other grades of lamb in each of the 7 equations. If a significant coefficient exists for any M_j, then averaging will be occurring between it and M_i. For example, if the model being used to analyse grade PX's margin, and significant negative coefficients are present for the variables MYL and MPL (the margins for grade PL and YL) then the margins from grade PL and YL will be being used to subsidise grade PX margins. This would be the case if the wholesaler sets a low margin and therefore a high schedule price on grade PX, which

is cross subsidised by MYL and MPL. A positive coefficient would mean the opposite is occurring.

A monthly lagged dependent variable (M_{it-1}) has been included as a result of a partial adjustment assumption. Research suggests that marketing chains do not completely adjust their pricing or production decisions in one period as a response to a price change. This may be due to costs, capital or other constraints (Doran and Guise 1984). If the previous months marketing margin has an significant impact on this months margin, a significant positive coefficient will be present for (M_{it-1}).

Theory suggests that the cost of providing marketing services should be related to the marketing margin. A proxy for marketing costs is included to check if as marketing costs increase, marketing margins rise. If marketing costs influence marketing margins, a positive coefficient will be likely to exist, as an increase in the price of wholesale marketing costs will result in higher marketing margins and therefore higher export, or lower schedule prices.

The hypothesis that a high number of lambs slaughtered will not effect marketing margins is tested for by the inclusion of a monthly slaughterings (S_i) variable. A high level of turnover might be expected to reduce average fixed costs and therefore average costs per kilogram of meat exported. If this occurs, and the reduction in costs will result in a lowering of margins, and the coefficient for slaughterings will be significant and negative.

Export cuts represent a large proportion of the value and volume of lamb exported. Cuts come from the lamb grades being analysed as well as grade YX, F, C, and T carcases. Due to increases in costs, including more intensive labour, increased processing, and increased loss of tissue, it is likely that there will be increased marketing margins for cuts but as no data exists on exactly which lamb grades these cuts come from, their margins can not be calculated. This means the exact effect cuts originating from a

specified lamb grade have on schedule price for that lamb grade is unable to be determined.

The hypothesis being tested checks whether the changing value of total cuts influences the margins offered for carcasses. The value of cuts exported has been increasing in recent years. It may be expected that an increase in the value of cuts could lead to an averaging process which would allow margins to fall and schedule prices to rise relative to export prices. For example, if an increase in the value of cuts leads to higher returns to producers for any lamb grade, averaging will be taking place with cuts. However with competitive markets this would not be expected.

If the demand for cuts is an independent new demand, then aggregate demand will increase, but it would not pay exporters to alter the margins for carcase meats, which represent the actual cost of marketing meat in a competitive environment. Even if there is substitution it would only pay to reach an equilibrium where the prices charged for both cuts and carcases reflect the relative price of processing above a schedule price, which represents the opportunity cost of acquiring meat. Thus, the changing export mix would not be expected to influence the margins for carcase meats in perfectly competitive markets, and in the absence of any averaging behaviour. If a significant negative coefficient exists for the VC variable in any equation it is likely that cuts will be subsidising schedule prices for that lamb grade, with schedule prices being maintained above market equilibrium levels.

To summarise, the null hypotheses being tested are:

1. Ho: Price levelling does not have a significant influence on the marketing margins for different grades of lamb in New Zealand.
2. Ho: Price averaging does not significantly influence the marketing margins for different lamb grades in New Zealand.
3. Ho: Marketing margins are unrelated to the cost of providing marketing services.
4. Ho: Marketing margins are not related to the monthly slaughters (by weight) for each grade of lamb.
5. Ho.Lamb cuts (both bone in and bone out) have no effect on marketing margins.

By examining these hypothesis the effects that different variables have on margins can be examined, and if the export demand is assumed to be elastic, the subsequent changes in schedule prices can be determined..

3.2.METHOD OF ESTIMATION:

The model is estimated in linear form with coefficients expressing the absolute change in the margin in c/kg for each one unit change in the variables. Previous research that has examined monthly or quarterly changes in marketing margins for meat, including that conducted by Yandle (1968), Fuller and Ladd (1961) and, Griffith (1974) has also estimated models in linear form.

Two stage least squares (2 S.L.S.) is the estimation technique used. This solves the problem of simultaneous equation bias that would occur if ordinary least squares was used as an estimation technique, as margins are determined simultaneously. The two stage least squares is a special case of the instrumental variable technique in which the "best" instrumental variables are used. Kennedy (1985) suggested combining all exogenous variables to create a combined variable to act as a "best" instrumental variable. Since it is equivalent to indirect least squares, in the just identified case, 2 S.L.S. is usually applied uniformly to all identified equations in the system.The instruments used are Pi, Pi_{t-1}, S_i, PXC, WC, and C (the constant).

In Durbin and Watson (1951) the authors warned that the Durbin Watson statistic did not provide an adequate test for the AR(1) error process in the presence of a lagged dependent variable. Durbin(1970) proposed the use of the Durbin's h statistic to test for autocorrelation errors in the model. All equations are tested for autocorrelation using Durbin's h test.

The data consists of 36 monthly observations over the period from October 1985 to October 1988.

Chapter 4 **RESULTS:**

This section reports on estimates of the 7 wholesale margin models as shown in table 3 on page 28. The bold figures are coefficients while the light numbers below are t scores. An asterisk beside a t score indicates significance at the 5% level. In all estimates R^2 are relatively high. There is no evidence of significant autocorrelation when tested with Durbin's h test. Correlations between M_i and P_i,and are high, but this is to be expected, and should not lead to model misspecification. The highest simple correlations between other variables are 0.72 between MYM_{t-1} and PYM_{t-1}, and 0.70 between MPX_{t-1} and PPX_{t-1}. The correlations between existing variables seems satisfactory.

4.1 Price Levelling:

In all 7 equations wholesale margins are positively related to current export prices and negatively related to past export prices. Both variables are significant in all cases. Emphasis should not be placed on these coefficients, but on multipliers interpret the effect export price changes have on schedule prices, and long run marketing margins. Multipliers estimated for each lamb grade are presented in table 2.

Table 2 **Estimates of Multipliers**

MULTIPLIERS		MA	MPL	MPX	MPH	MPM	MYL	MYM
LONG RUN	**dFi**							
Schedule	**dPi**	4.00	0.71	-0.06	-0.12	0.11	0.17	0.07
SHORT RUN	**dFi_t**							
Schedule	**dPi_t**	0.12	0.19	-0.02	-0.01	0.10	0.16	0.04
LONG RUN	**dMi**							
Margin	**dPi**	-3.00	0.29	1.07	1.13	0.89	1.09	0.93

Table 3 **Coefficient estimates for Individual Meat Margins**

	C	P_i	$P_{i(t-1)}$	(M_{it-1})	MA	MPL	MPX	MPH	MPM
MA	0.77 0.19	0.88 * 13.92*	-0.82* -8.32*	1.02 * 12.57*		0.06 0.68	-0.02 -0.42	0.01 0.16	-0.17 -1.10
MPL	*8.47* 0.18	*0.81** 8.40*	*-0.58** -3.69*	*0.21* 1.44	*-0.08* -0.14		*0.03* -0.14	*0.01* 0.32	*-0.01* 0.02
MPX	*55.46* 1.96	*1.02 ** 24.83*	*-0.57** -5.18*	*0.58** 5.55*	*-0.09** -2.27*	*-0.06* -0.72		*0.05* 1.55	*0.22* 1.79
MPH	*40.1* *1.25*	*1.01* *29.36**	*-0.65** *-5.76**	*0.68** *5.69**	*-0.10** *-2.49**	*-0.05* *-0.54*	*0.01* *0.04*		*0.21* *1.57*
MPM	*3.28* *1.26.*	*0.90** *8.32**	*-0.40** *-2.48**	*0.44** *3.08**	*-0.13** *-2.34**	*-0.02* *-0.41*	*-0.01* *-0.40*	*0.02* *0.63*	
MYL	*50.16* *1.32*	*0.84** *7.46**	*-0.51** *-2.65**	*0.58** *2.88**	*-0.02* *-0.49*	*0.11* *1.25*	*0.03* *-0.06*	*-0.02* *-0.62*	*-0.21* *-1.60*
MYM	*99.68* *2.86**	*0.96** *9.36**	*-0.29** *-2.18**	*0.28* *2.04*	*-0.14** *-3.30**	*0.05* *0.90*	*-0.04* *-1.09*	*-0.02* *-0.53*	*0.15* *1.60*

Table 3 (continued)

	MYL	MYM	MC	S_i	VC	R^2	Dh	$F_{12,23}$
MA	-0.19 -1.36	0.14 0.92	-0.01 -0.40	$-0.93x10^{-2}$ 2.07*	$-0.31x10^{-3}$ -1.43	0.94	-1.23	48.82
MPL	0.02 1.45	0.02 0.16	-0.02 -0.77	$0.69x10^{-3}$ 0.64	$0.49x10^{-4}$ 0.15	0.86	-0.12	20.16
MPX	-1.11 -0.95	0.01 0.02	0.01 0.14	$0.21x10^{-3}$ 0.20	$-0.29x10^{-4}$ -0.15	0.96	0.09	81.68
MPH	0.01 0.07	-0.02 -0.17	0.01 0.31	$-0.21x10^{-2}$ -1.12	$-0.29x10^{-5}$ 0.01	0.97	-1.35	117.74
MPM	0.04 0.40	0.15 1.58	-0.01 -0.84	$0.16x10^{-3}$ 0.81	$-0.15x10^{-3}$ -0.95	0.90	-0.29	29.83
MYL		0.14 1.14	0.10 0.49	$0.40x10^{-3}$ 1.56	$-0.11x10^{-3}$ -0.57	0.81	-0.12	14.21
MYM	-0.01 -0.14		0.01 0.08	$0.63x10^{-3}$ 0.78	$0.12x10^{-3}$ 0.74	0.94	0.02	48.80

In all cases short run multipliers show that significant short run price levelling is occurring. For most grades the short run price multipliers are close to zero indicating that levelling is almost complete, and that short run export price changes (over periods of one month or less) have very little impact on schedule prices. Export prices have a slight impact on schedule price for grades A, PL and YL, all of which are light lambs slaughtered early in the season. Due to the lack of other information available, exporters may be more reliant on export prices when determining schedule prices for these lamb grades. The results are comparable with previous research which shows short run price levelling occurs in the meat industry including that by Marceau(1967), Parish (1967), Woodward (1968), and Griffith (1974 and 1989).

The long run margin multiplier yields results that are almost identical to the long run schedule price multiplier, which is to be expected, as the link is derived. This discussion will be mainly concerned with long run schedule multipliers as it is the changes in schedule price that this study is concerned with and therefore the schedule price multiplier is easier to interpret. Long run levelling of margins, and stabilisation of schedule prices is taking place in all grades with the exception of grade A and PL. While theory suggests that coefficients for long run schedule multipliers should not be negative, the negative coefficients for MPX and MPH are not significantly different from zero and therefore do not cause concern.

A long run schedule multiplier of 4.00 for MA indicates that schedule prices are extremely responsive to long run changes in export prices for grade A lambs. The multiplier of 0.71 for MPL implies that in the long run, schedule prices change in response to export price changes and price levelling does not take place. As the multiplier of 0.71 for MPL is considerably less then that for MA, grade PL schedule prices are not as responsive to changes in export prices as grade A prices are. Long run levelling may be absent for the light grades, MA and PL because they are slaughtered early in the season. Exporters may rely more on previous months export prices when setting schedule prices, as killing seasons for these grades are very short, and as killing takes place early in the season, there may be a lack of other data on which to base schedules. Margins from

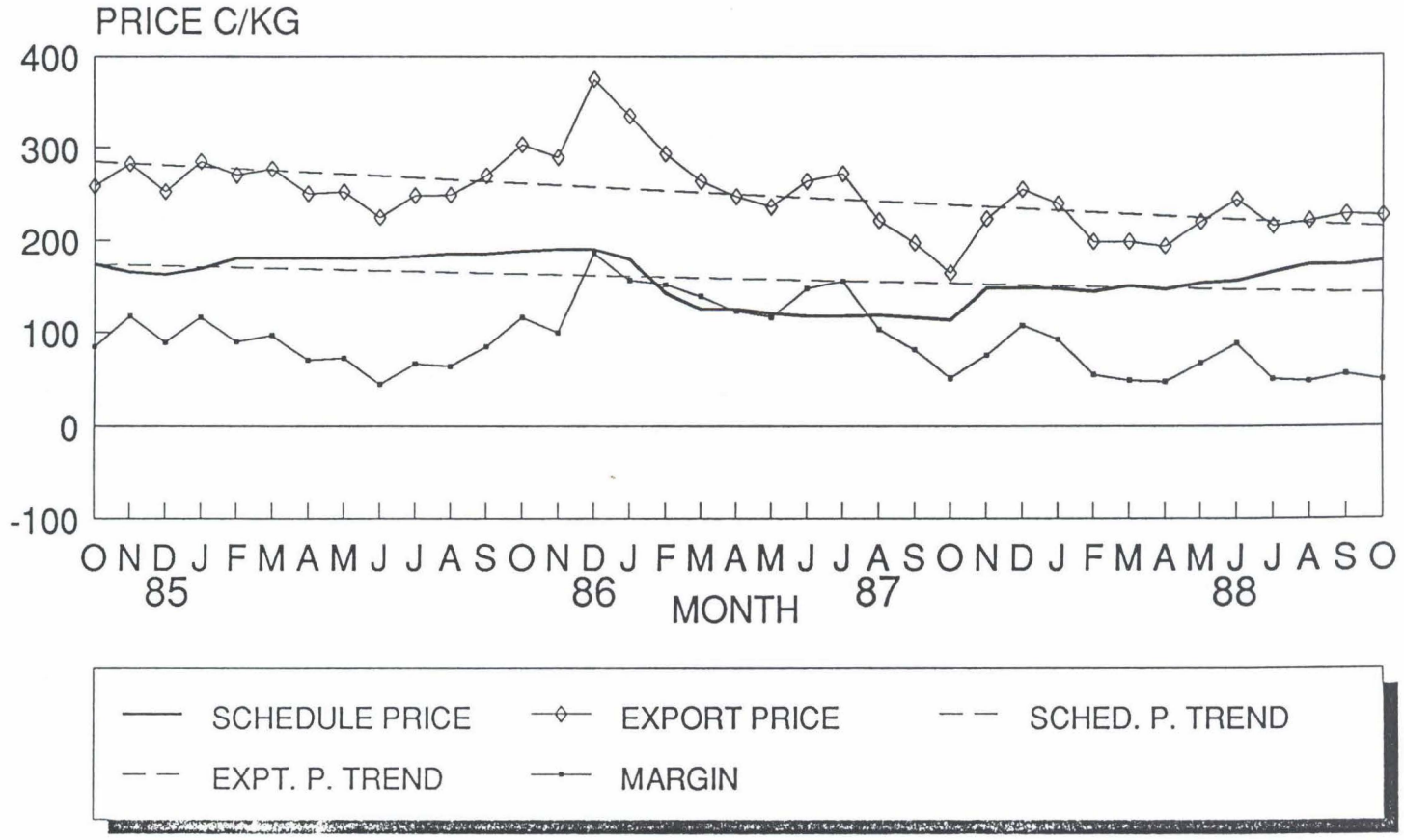
another light grade, YL, are the next most responsive to long term changes in export prices.

The monthly margins, export prices, and schedule prices for the period of the study are shown in graphs four to ten. The fluctuation of export prices may be caused by a combination of factors including variability in the volume of monthly exports. To determine the exact cause of the fluctuations, further research would have to be conducted. In all cases the margins seem to move up and down in response to changes in the export price while schedule prices stay relatively constant. This indicates levelling and agrees with the empirical results. The graphs show that in months of low export returns, marketing margins may drop below zero for most grades, as exporters are selling meat at a lower price than which they bought it. These months may be when low volumes of exports are being sold and therefore the loss by exporters is not be great, or when excess stocks are being sold at a cheap price. Rather than reduce schedule prices, exporters may be prepared to accept a loss in order to maintain schedule prices at present levels, and avoid losing producers custom. During these periods it is possible that averaging may be taking place, with returns from wool, pelts and by-products being used to subsidise the losses or low returns, exporters are receiving for a grade of meat.

Graph 4

A GRADE

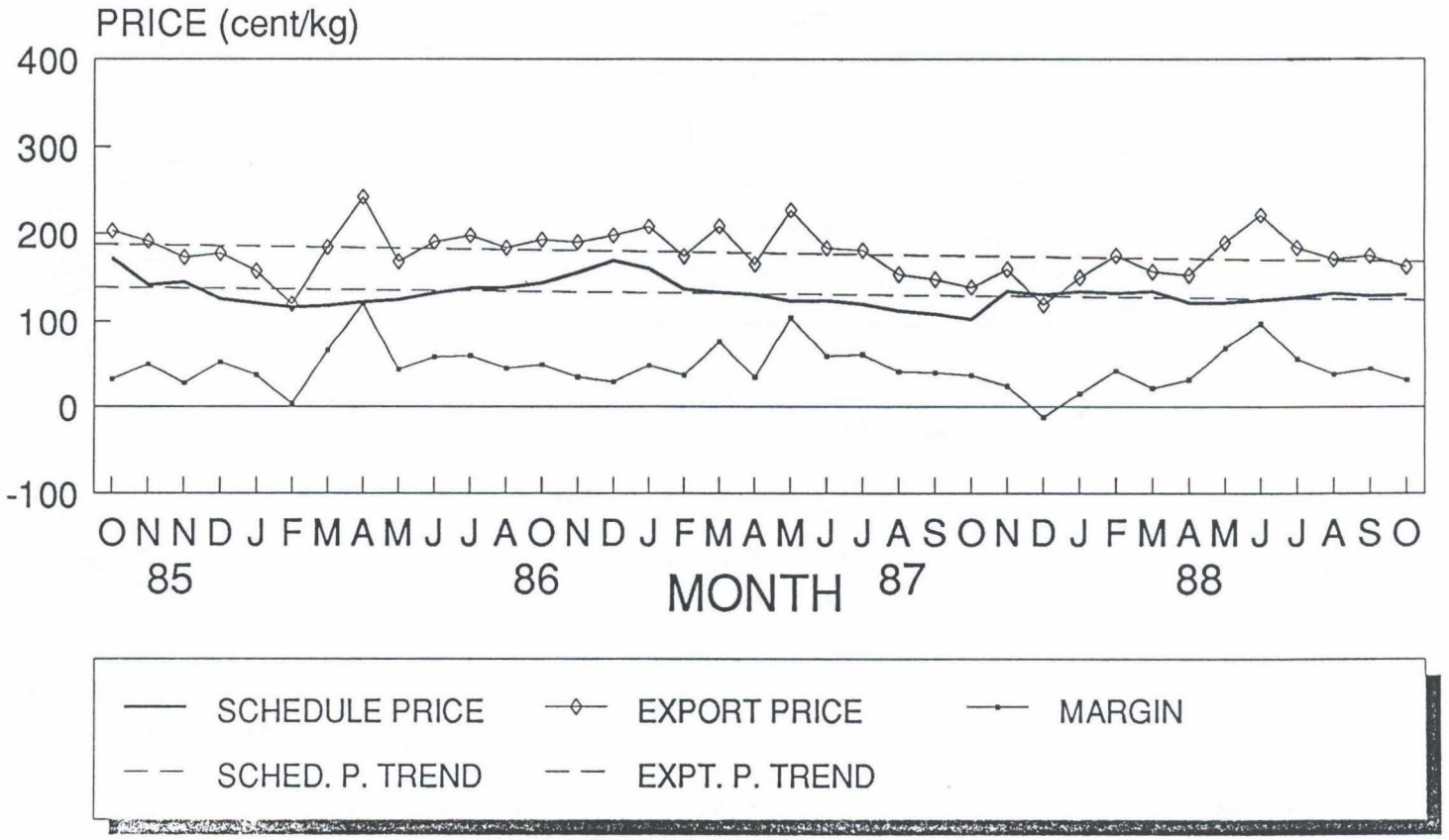
SHOWING MARGINS, EXPORT PRICE, AND SCHEDULE PRICE



Graph 5

PL GRADE

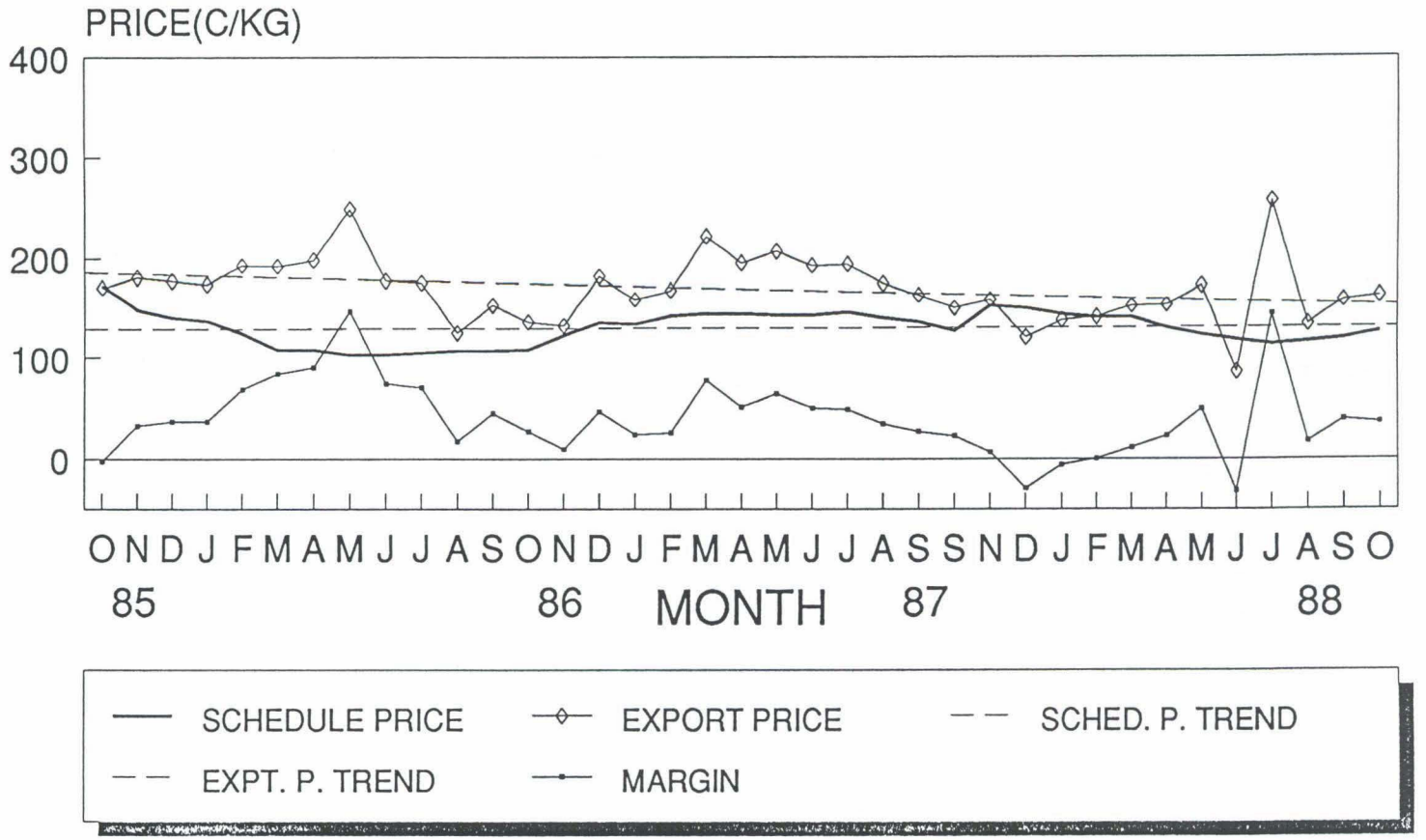
SHOWING MONTHLY MARGINS, EXPORT PRICES AND SCHEDULE PRICES



Graph 6

PX GRADE

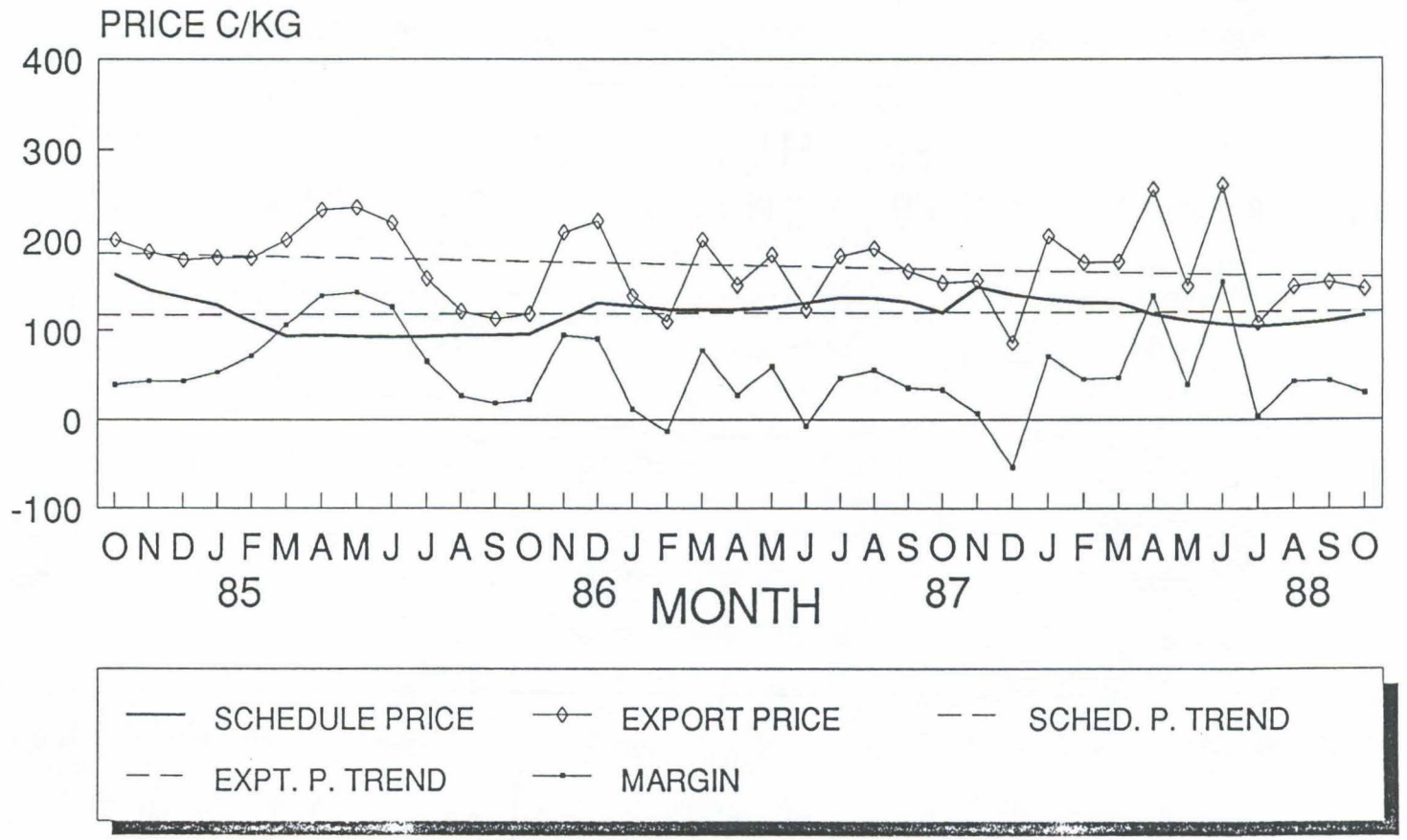
SHOWING MONTHLY MARGINS,EXPORT PRICES, AND SCHEDULE PRICES



Graph 7

PH GRADE

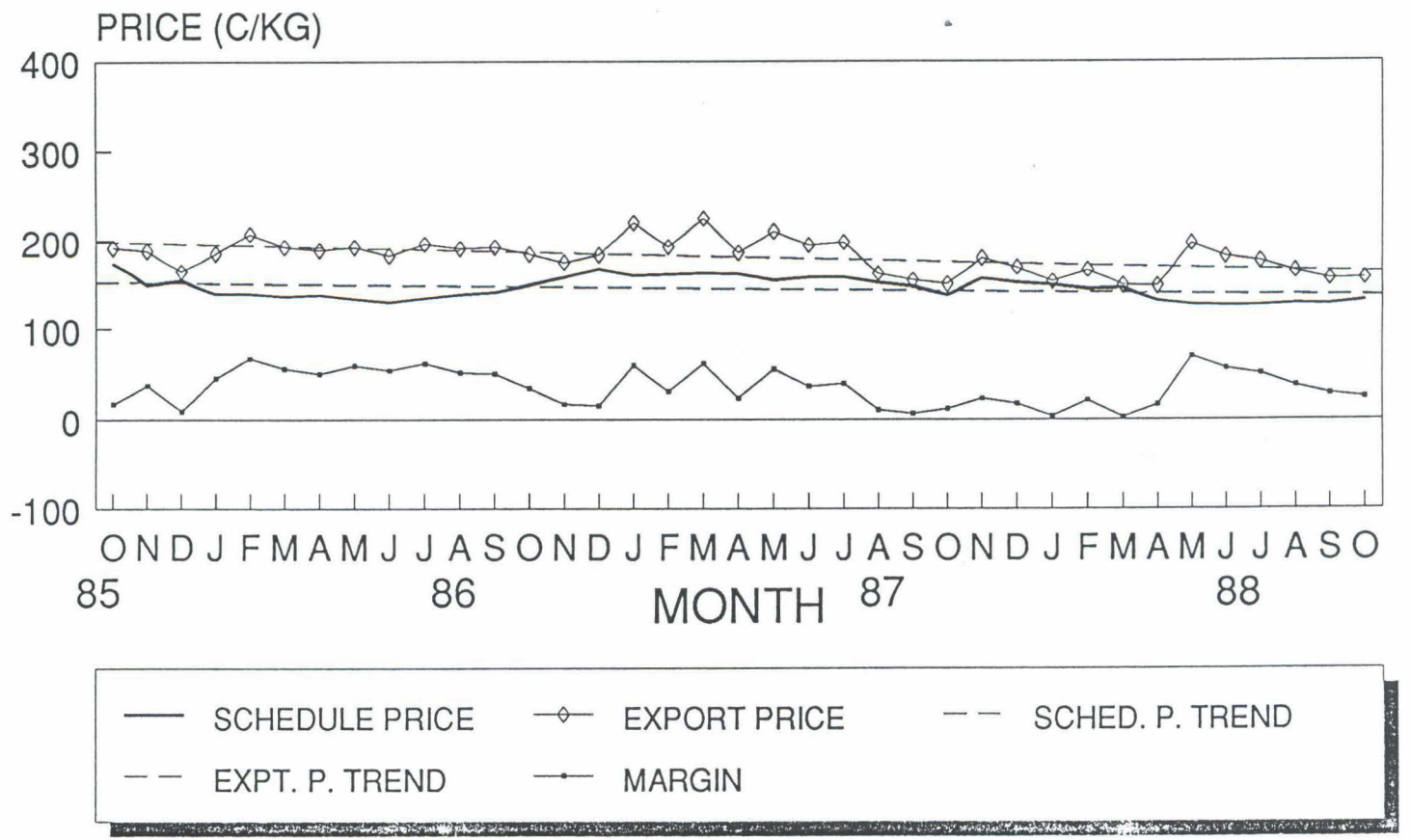
SHOWING MARGINS, EXPORT PRICES, AND SCHEDULE PRICES



Graph 8

PM GRADE

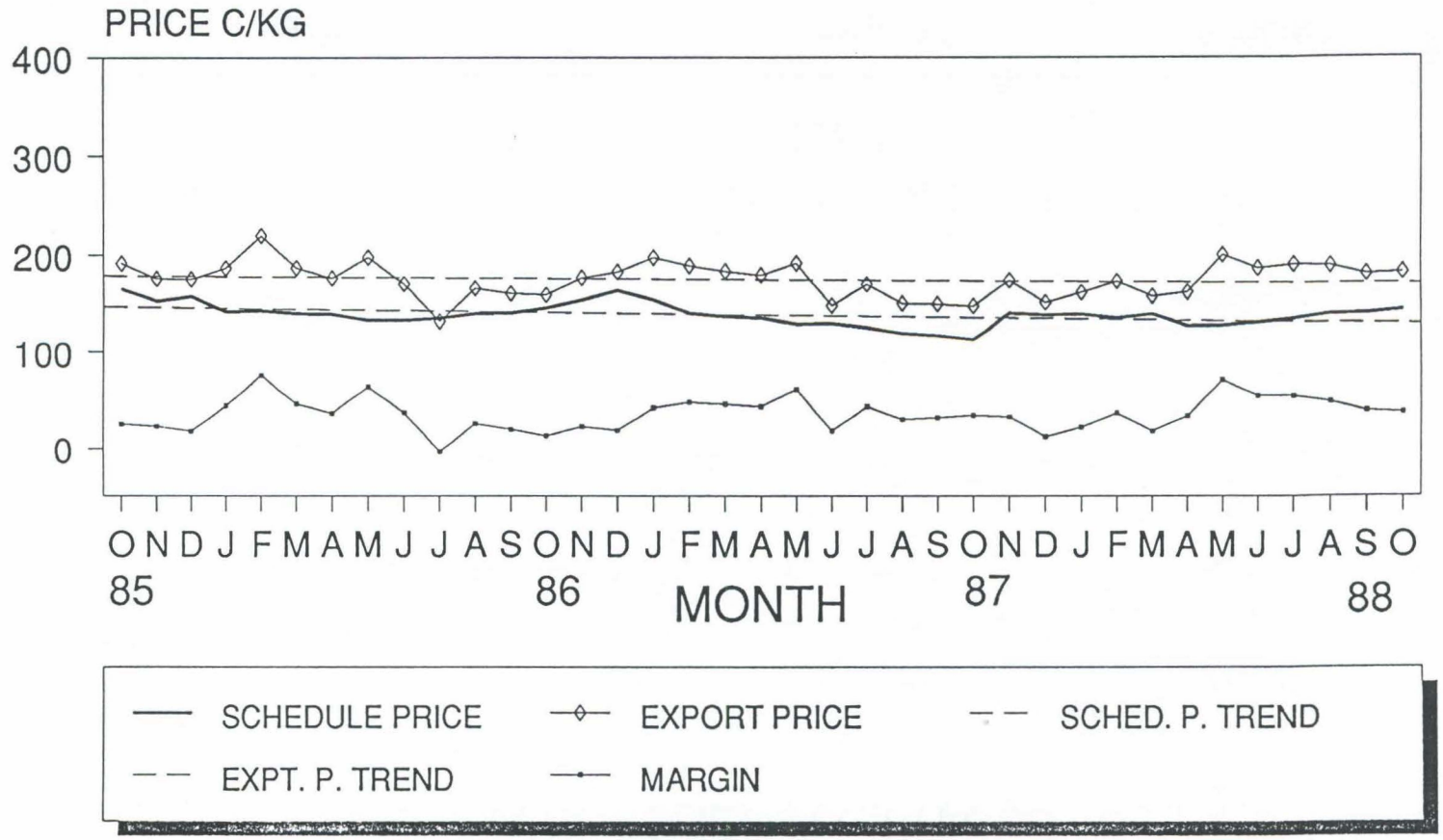
SHOWING MONTHLY MARGINS, EXPORT PRICES, AND SCHEDULE PRICES



Graph 9

YL GRADE

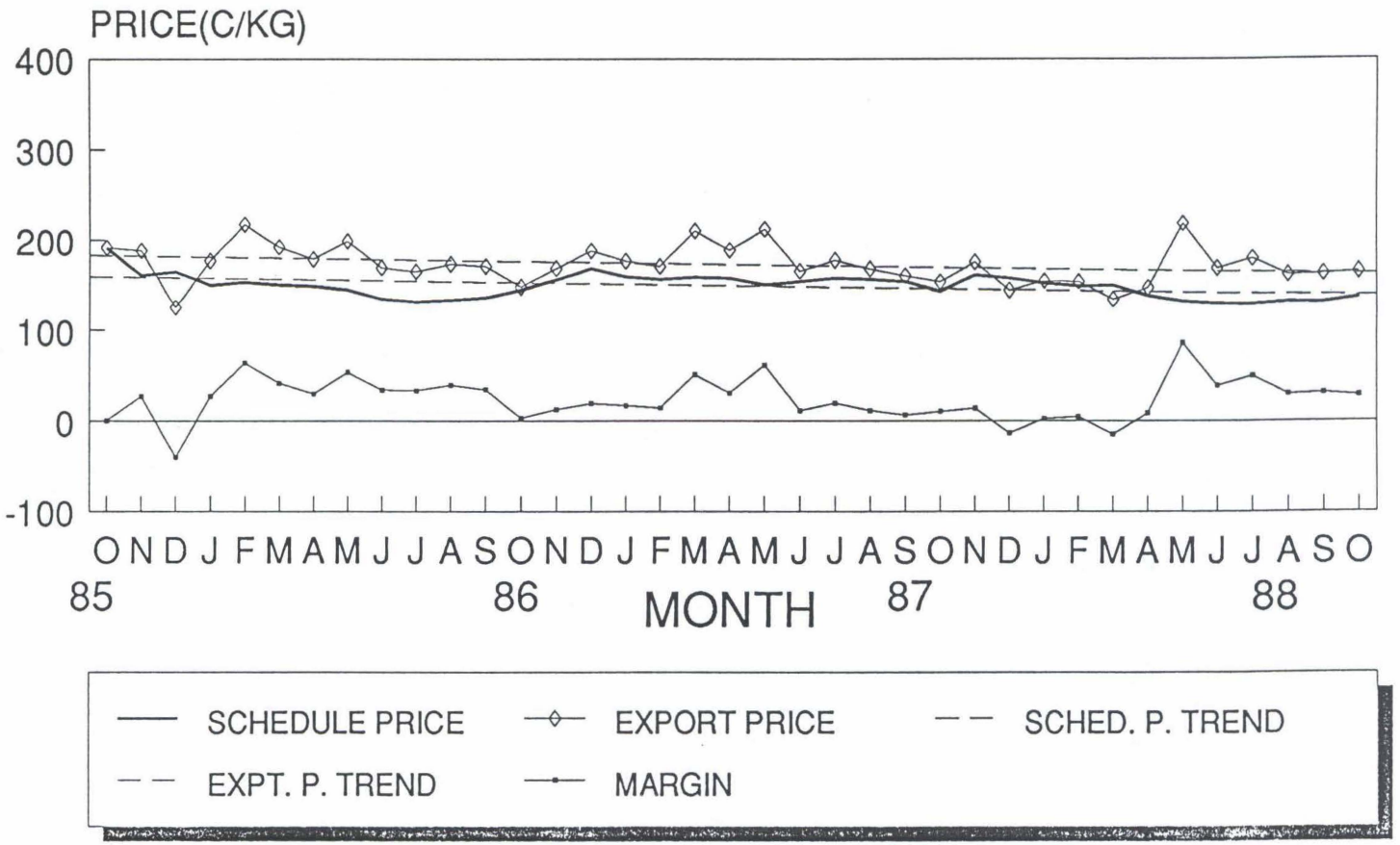
SHOWING MONTHLY MARGINS, EXPORT PRICES, AND SCHEDULE PRICES



Graph 10

YM GRADE

SHOWING MARGINS, EXPORT PRICE, AND SCHEDULE PRICE



4.2 Price Averaging:

The only significant instances of short run (over periods of one month or less) price averaging occur in the equations for MPH, MPX, MPM, and MYM with the variable MA. The results indicate that price averaging is not complete as none of the coefficients are plus or minus 1 or more. For each equation in which MA is significant, the coefficients on MA are negative, therefore it appears that the margin for grade A lambs is responsible for lowering MPH, MPX, MPM, and MYM. If export demand is assumed to be constant MA is responsible for a decreasing margins for lamb grades PH, PX, PM, and YM, and therefore increasing their schedule prices. A possible explanation of this result is that grade A lambs are very light and are mainly slaughtered early in the season. Exporters may be able to set higher margins on grade A lambs as competition for these lambs may not be intense, with many chains may not be operating early in the season. Graph four indicates the high margins for grade A lambs in comparison to the other margins shown in graphs five to ten. The high MA may result in excess returns which are used to subsidise the margins for lambs killed later in the season. This may help explain why the coefficients for the variable MA are insignificant for the equations PL and YL, as these are also very light lambs, mainly slaughtered when the killing season is beginning.

The results are asymmetrical as averaging does not appear to be reversible. While grade A margins are subsidising the margins for grades PH, PX, PM, and YM these grades do not appear to have an impact on MA. The coefficients are very small, indicating that although they are significant MA only lowers the margins MPH, MPX, MPM, and MYM slightly. Considering the small volume of grade A lambs exported the effect per grade A lamb is more considerable. Coefficients on all other margins are not significant, and therefore averaging does not appear to be taking place. The long run multipliers for averaging are insignificant, but the significance of the lagged dependent shows that complex dynamic relationships between margins occur over time.

4.3 Marketing Costs:

Marketing costs show no significance for any equation. This is a surprising result as theory suggests that marketing costs should have a positive impact on marketing margins.

A likely reason for the insignificance of MC is the fact that real indicators are used, that do not change greatly compared with the nominal data used for other prices. The proxy used may not be a good indicator of wholesale marketing costs, as costs other than labour probably play an important part in the determination of wholesale marketing costs. The effect of long run changes in costs is likely to be more significant than the monthly changes tested for here.

4.4 Slaughterings:

The monthly slaughterings (throughput) variable does not prove significant for any lamb grade, with the exception of grade A. A negative coefficient for SA means that an increase in the volume of lamb slaughtered leads to lower marketing margins, and therefore higher schedule prices for grade A lambs. A possible reason for this is the fact that grade A lambs make up a large proportion of the lambs slaughtered early in the season. Increasing the throughput of grade A lambs may significantly increase the aggregate lamb throughput, and result in lower monthly average fixed costs, per grade A lamb. Later in the season aggregate slaughterings are made up of a wider variety of lamb grades and a greater volume of meat is slaughtered, therefore an increase in turnover for a specific lamb grade may only cause a relatively small increase in the aggregate turnover for a month. Monthly average fixed costs per kilogram of lamb slaughtered may therefore not decrease significantly.

While this may be one argument why grade A lambs reduce average monthly fixed costs more than other lambs, the insignificant S_i variable for other lamb grades does not necessarily mean that increased volumes of these lambs being processed do not lower average fixed costs, only that the differences are not passed onto the producer through higher schedule prices which would result in decreased margins. Section 4.3. suggests that short run changes in marketing costs are not transmitted to schedule price changes, as they do not appear to influence margins. A decrease in average fixed costs as a result of increases in slaughterings of a specific lamb grade may also not be transmitted to other levels in the marketing channel.

4.5 Lamb Cuts:

The results show that the coefficient for the value of cuts is close to zero and insignificant in all equations. While all coefficients are very small, emphasis should not be placed on their size as this is likely to be effected by the units. Results indicate that margin for any lamb grade is not affected by the aggregate value of cuts therefore averaging does not appear to be taking place between the value of cuts and any lamb grades margin. To determine the exact effect that cuts originating from a specified lamb grade have on the margin for that grade, more information is necessary regarding the grades from which cuts originate, and cuts export value and volume for each grade. Currently this information is not collected.

Chapter 5:

CONCULSIONS:

5.1 IMPLICATIONS:

In this study empirical evidence has been provided on the relationship between export prices and marketing margins for a number of lamb grades in New Zealand. This helps gain a better understanding of those factors which have a significant impact on margin behaviour, and therefore schedule prices.

By far the greatest amount of concern with the meat marketing system has been aimed at the process of levelling and averaging (Griffith 1974). The major criticisms of levelling and averaging is that these practices distort resource allocation in the lamb industry, and therefore restrict farmers ability to efficiently plan production decisions on the basis of demand.

The general conclusion of this study is that the transmission of supply and demand to schedule prices is distorted in the short run and in many cases in the long run, by price levelling. Levelling means that marketing margins of lamb meat follow trends in export prices. If export prices rise, margins rise while if export prices fall they fall, therefore trends in export prices are not reflected in schedule prices. The short run effect of the levelling is not great, as producers and exporters may in fact gain benefits from operating under a stable price regime, as unstable prices have been linked to inefficiencies in resource use. The benefits that short run price levelling have to both producers and exporters have been discussed in section 2.2.1. Overall short run levelling which stabilises schedule prices does not seem likely to affect the allocative function of producers to any great extent.

Long run levelling is taking place with lamb grades PM, PX, PH, YM and YL. The implications of long run levelling are much more serious, as it is likely to distort resource allocation. Long run levelling may lead to long run averaging between lamb grades although this has not been determined in this study. If there is long run levelling leading to lower margins for grades, PM, PX, PH, YM, and YL, it is likely that some form of

subsidisation would be necessary to maintain their schedule prices. This would distort production away from grades in market demand, and lead to misallocation of resources. There may be a relationship between long run levelling and short run averaging, as grade A lambs are being used to subsidise the schedule price for grade PM, PX, PH, and YM lambs in the short run.

The government has been involved with price stabilisation schemes introduced in the past. This study implies that the government policies that lead to the stabilisation of schedule prices, and are aimed at stabilising producers incomes, may not be necessary. Levelling appears to be occurring without intervention.

Results show that short run averaging is occurring, as grade A margins are being used to subsidise margins for grade PX, PM, PH, and YM lambs. This means schedule prices for grade A lambs are likely to be lower, while those for PX, PM, PH, PM and YM higher, than is economically efficient. Producers are therefore being diverted away from producing grade A lambs and encouraged to produce grade PX, PM, PH, and YM lambs. Averaging means prices are distorted from market determined levels and desirable adjustments in production are slowed down or prevented.

In the short run changes in marketing costs do not appear to influence marketing margins. If monthly marketing cost changes are insignificant, this should not create problems, but if cost changes are significant and not passed onto producers as a result of changes in marketing margins a type of levelling will be taking place. With levelling the price transmission mechanism will not be working accurately as changes in marketing costs will not be transmitted to schedule prices.

It appears that an increase in the slaughterings of grade A lambs, reduces average fixed costs, and that this reduction in costs leads to decreased margins. If the throughput for other lamb grades also significantly reduces average fixed costs, but these changes are not passed onto schedule prices through reduced margins, the pricing mechanism is not reflecting changes in costs and is therefore inefficient, as a type of levelling is occurring.

While the value of cuts exported has been increasing, the aggregate value of cuts does not appear to have an impact on marketing margins for any lamb grade. Averaging does not appear to be taking place between the the value of cuts and the margin of any lamb grade, therefore the market price transmission mechanism appears to be operating in a competitive manner with respect to cuts.

Some of the factors that have not been analysed in this study because of the difficulty involved, or problems in obtaining data may also influence schedule prices. A brief discussion of some of the possible impacts that the activities of the Meat Industry Association, wool,pelts and by-products, and stocks may have on marketing margins is included in appendix 2.

The problems involved in obtaining information for this study highlight the problems farmers have in getting data on which to base decisions. One way of shortening the reaction time of producers to changes in schedule prices may be to increase the accessibility of information. While in the early periods of this study it was very difficult to obtain company information, with many companies not publishing schedule prices this seems to have changed recently with private companies publishing and selling schedule information. Higher prices by certain meat companies may mean producers will shop around to gain the best deal.

The results of this analysis could be utilised in conjunction with other models of the livestock and meat sector. They could be spliced onto a model that predicts monthly lamb prices by grade. An area worthy of further research, is the examination of the impact of changing export volumes of lamb on schedule prices. The model may be able to be modified to examine the effects that changing marketing margins have on schedule prices, or to analyse if averaging is taking place between the value of pelts or wool, and the schedule price, for a lamb grade or grades.

5.2. LIMITATIONS

In this study considerable problems existed in obtaining consistent data. A lot of information is classified and therefore unattainable, such as the average lamb prices by grade which are collected by the Meat and Wool Boards Economic Service. Three different sources of schedule prices are used during the study, which may lead to inconsistency.

Export statistics data not only includes the value of lambs sold by schedule, but also the export value of lambs farmers sell by other means such as by pooling. The use of aggregate export statistics data may limit the accuracy of the results, however the degree of error may not be great in a perfectly competitive environment as the per kilogram export returns from meat sold by schedule and other sources, such as by pooling, could be assumed to be equal.

Payments for wool, pelts, and by-products are not included in this study. If averaging is taking place between the value for these products and a lamb grades margin, this would limit the accuracy of these results, as a relevant variable would be excluded. The impact of frozen stocks and domestic consumption should also be considered, but there is no information by grade on these factors. A potential source of error is that the proxy for costs is uninflated while other prices used are real. This may be the reason why marketing costs were insignificant.

Rather then using current price and lagged price variables in the same equation it may be better to use a weighted average of past export prices. This would mean that all adjustments to price changes do not occur in this period or the next period, and would eliminate some of the problems of containing a price variable and lagged price variable in the same equation.

Finally, there were some unattended to econometric problems. Although the correlations between some P_{it-1} and M_{it-1} variables may cause problems with multicollinearity they are accepted as this form of the equation brought about best overall model specifications. As the contemporaneous covariances between the 2 S.L.S. error terms are non zero it may have been more asymptocally efficient to use 3 S.L.S. A model

that directly depicts factors responsible for changes in schedule prices may better explain schedule price changes, than a model that examines marketing margins and therefore schedule price changes indirectly.

5.3. CONCLUSION

This study involved the analysis of monthly changes in schedule prices for various lamb grades from the period October 1985 to October, 1988. To do this, changes in marketing margins were analysed. To test the impact of a number of factors on marketing margins, models used by Griffith (1974) and Griffith and Duff (1989) were adapted.

The results show that there is short run price levelling in all grades, with long run price levelling also present in all grades with the exception of A and PL. Averaging is taking place with grade A lambs being used to subsidise schedule prices for PM, PX, PH and YM lambs, meaning schedule prices for these lambs are likely to be higher then market determined levels. The effect of marketing costs did not prove significant. This result was surprising, and probably because the proxy used was not a good indicator of marketing costs, and short run, not long run changes in costs were analysed. The level of throughput did not significantly effect margins, except for grade A lambs where an increase in throughput reduced marketing margins. For other lamb grades although throughput may reduce average fixed costs, these changes did not appear to be passed on to the producer through higher schedule prices. While the aggregate value of cuts did not appear to alter the schedule price for any lamb grade, the effect that the value of cuts obtained from a specified lamb grade have on the margin for that lamb grade is unable to be determined due to the limited availability of information on cuts.

Firms involved in the exporting of lamb, face considerable short run variability in the prices they receive for lamb. This study shows that schedule prices are much more stable as a result of stabilisation by exporters of schedule prices (price levelling).

To conclude, although short run price levelling occurs, it does not appear to greatly interfere with the effectiveness of price signals transmitted from the exporter to the producer. The same may not be true for long run levelling. Averaging results in

misallocation of resources as producers base their production decisions on schedule prices which are higher than market determined levels for grade PM, PX, PH, and YM lambs.

This exploratory study is sufficient to establish the broad parameters that influence the transmission of prices, from wholesale to farmgate level, but further exploration is necessary in order to fully understand the price formation process.

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APPENDIX 1

SOURCES OF DATA:

Pi, Pi_{t-1}: New Zealand Department of Statistics. *External trade monthly summary list of exports by country of destination.*

MC: New Zealand Department of Statistics. *Consumer Price Index.*

Si New Zealand Meat Producers Board unpublished data. *Export Livestock Slaughterings* (bone in weight) on a weekly basis. Average monthly prices are used.

VC: New Zealand Department of Statistics. *External trade monthly summary list of exports by country of destination.*

M_j: Marketing margins are the difference between the F.O.B. export price of lambs and the schedule price paid to farmers.The schedule prices used are for bare meat only, with an additional payment being made for the wool and pelt. In all cases premiums are added to schedule prices if they are applicable. There are considerable problems in obtaining an average monthly schedule price for each lamb grade being studied. As no data was available for the whole period of the study, three different sources are used. The sources are:

October 1985 to March 1987. *Meat Exporter Producer payments* published weekly by the New Zealand Meat Producers Board. An un weighted average is taken between North and South Island Prices. The prices issued here are only indicative of the prices being paid to farmers. The Meat Producers board stopped publishing schedules in March 1987.

April 1987 to September 1987: During this period there is no published average prices paid to farmers. Even individual companies schedule prices are hard to obtain. Information used is from the *Meat Schedule Monitor* published by the New Zealand Meat Producers Board on a weekly basis.Monthly unweighted averages for the companies Alliance, AFFCO, Challange, and Richmond are used.

October 1987 to October 1988: Unpublished data obtained from the Meat and Wool Boards Economic Service. The net data represents the amount farmers would received on a per head basis(including premiums). Deductions are made to take account of the following costs and make the data consistent with other schedule prices. The deductions are for:

Killing charges and freezing rates

Meat Inspection charges

Drafting/Administration costs

Levies

Transport from works to port

Again, average monthly data was calculated and used.

APPENDIX 2:

A brief discussion of three factors not analysed in this study that may influence lamb marketing margins:

This section gives a brief discussion of some of the possible impacts that three activities that are not included in this study have on marketing margins.

Although the activities of the M.I.A and coordinated marketing activities have not been examined in this study, they may have important influences on the formation of schedule prices, and therefore the implications should be discussed. Using export statistics for the year ended June 1987, it can be shown that bone in exports which were allocated to the market on a pro-rata basis accounted for 65% of total exports. If other single seller markets are also included 72% of export markets could be considered to be controlled. When exports to other E.E.C. countries which are also closely monitored because of voluntary restraint agreements are included, this figure rises to 84% of New Zealands bone in lamb exports (Zwart and Martin 1988). Exporters argue that these arrangements do not effect the determination of schedule prices and may in fact make exporters more competitive, as to gain a quota for next season meat companies must price their schedules high enough to attract competitors stock. While coordinated marketing activities may be a reason for the stabilisation of export prices, in a competitive environment this should not effect marketing margins.

The effects that payments for wool, pelts, and by-products have on M_i also have not been examined in this study, but may play an important part in the price transmission mechanism. It is possible that averaging may be taking place with pelts, wool, and by-products being used to subsidise meat prices in times of low export returns, and visa-versa. If the pricing system is efficient the schedule price for meat should be determined by the interaction of supply and demand for meat and not influenced by the price of wool or pelts, as producer and export payments for these products are separate from meat returns. As there is not a separate payment to producers for by-products, any returns over and above costs should be reflected in an increase in schedule prices if the market is competitive. The misallocation of resources caused by a short term averaging process

with pelts may not be great, as there is little the producer can do about the condition of his pelts, and the producer will still be receiving similar aggregate returns for lamb. With wool an averaging process may cause be harmful as it may influence a producers decision on whether to shear before slaughter, and therefore result in a misallocation of resources.

Most lambs are killed and then frozen and stored. Exporters could use these stocks to stabilise prices, selling increasing volumes of stocks when demand is high and storing more lambs when demand is low. While this could be a reason for the stabilisation of export prices, this study can not determine the effect on schedule prices.